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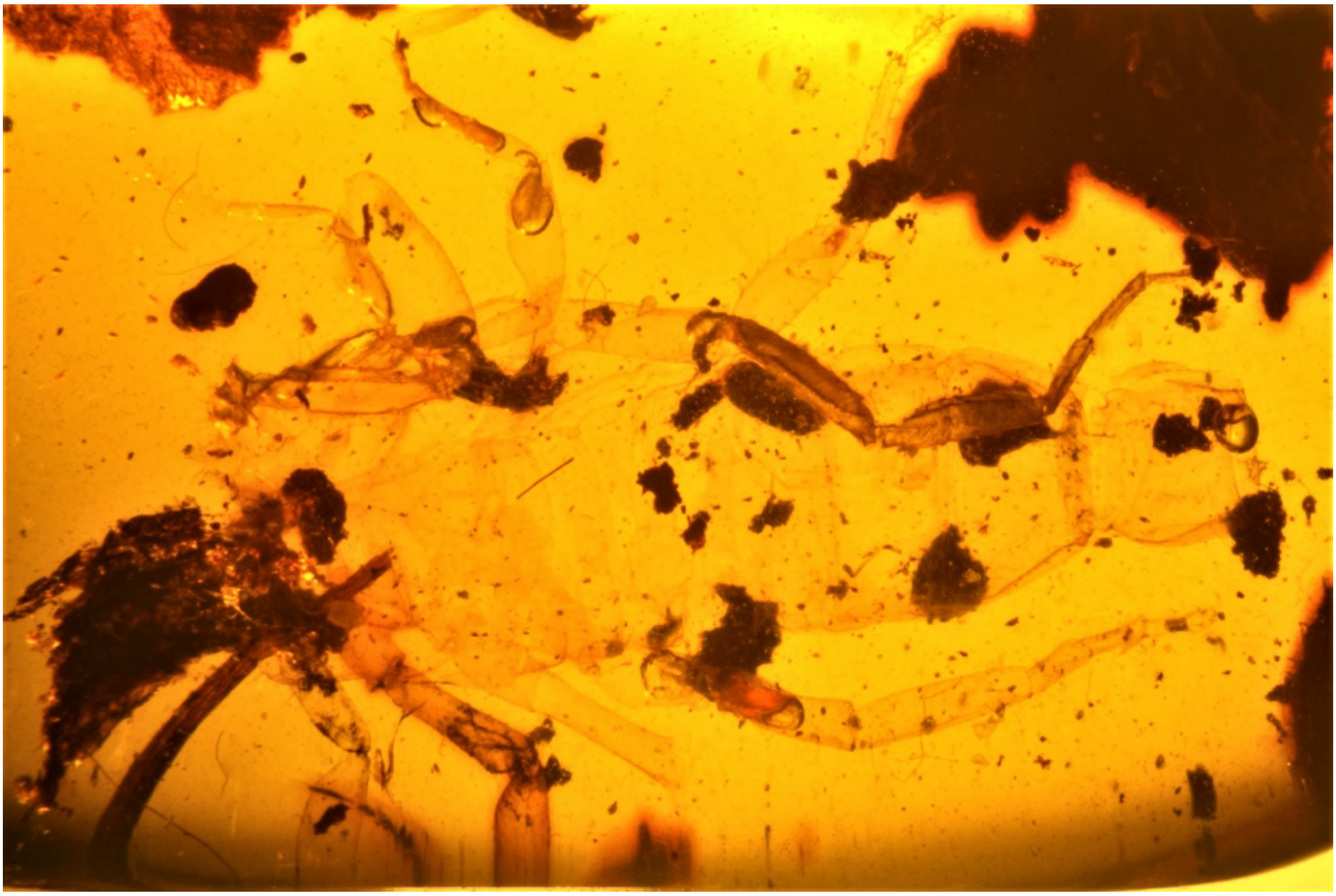

Volume 10
Numéro 35

Juillet 2022

ISSN : 2269 - 6016
Dépôt légal : Juillet 2022

Faunitaxys

Revue de Faunistique, Taxonomie et Systématique
morphologique et moléculaire

ZooBank : http://zoobank.org/79A36B2E-F645-4F9A-AE2B-ED32CE6771CC

Directeur de la publication, rédacteur, conception graphique et PAO:
Lionel Delaunay

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Faunitaxys est indexé dans / ***Faunitaxys*** is indexed in:
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Imprimée sur les presses de SPEED COPIE, 6, rue Tréfilerie, F- 42100 Saint-Etienne

Imprimé le 03 juillet 2022

Faunitaxys, **10**(**35**), 2022 : 1 – 5.
https://doi.org/10.57800/faunitaxys-10(35)

Further insights on Cretaceous Burmite scorpions with the descriptions of a new genus and species (Scorpiones: Buthoidea: Buthidae)

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Keywords:

Scorpiones;
Buthidae;
fossil;
new species;
new genus;
Cretaceousbuthus;
fraaijeorum;
Burmite;
variability;
description.

Abstract. – The study of three new scorpion specimens from Cretaceous Burmite leads to the descriptions of a new genus and new species which once again can be associated to the buthoid lineage and to the family Buthidae. The new species equally shows quite distinct characters, particularly a minorante trichobothriotaxy, when compared to other previous known Burmite elements, confirming therefore the existence of an important diversity within this fauna. The validity of two previously described species is also confirmed: *Spinoburmesebuthus pohli* Lourenço, 2017 (Family Palaeoburmesebuthidae) and *Chaerilobuthus serratus* Lourenço, 2016 (Family Chaerilobuthidae).

Lourenço W. R. & Velten J., 2022. – Further insights on Cretaceous Burmite scorpions with the descriptions of a new genus and species (Scorpiones: Buthoidea: Buthidae). *Faunitaxys*, 10(35): 1 – 5.

DOI : https://doi.org/10.57800/faunitaxys-10(35)

ZooBank : http://zoobank.org/B8ECE24D-D209-4716-ACAC-B9264B4D44AF

Received: 15/06/2022 – *Revised*: 27/06/2022 – *Accepted*: 28/06/2022

Introduction

As already outlined in several recent publications (Lourenço, 2021; Lourenço & Velten, 2021, 2022), the discovery and description of the first Cretaceous Burmite scorpion was done only 20 years ago (Lourenço, 2022). Nevertheless, a remarkable number of new descriptions took place particularly in the last 10 years, and the pace of new discoveries seems to increase every year. The important availability of pieces containing scorpions in Burmite is largely due to an intense commercial business which took place in recent years. Consequently, when possible these pieces are correctly study and classified.

Two groups appear to represent the majority of the scorpions found in Burmite: the family Chaerilobuthidae Lourenço & Beigel, 2011 and the family Palaeoburmesebuthidae Lourenço, 2015, and these remain the dominant scorpion fauna in the Cretaceous amber-producing forests of Myanmar. Nevertheless, several other groups or lineages have also been described (e.g. Lourenço, 2015, 2016a,b, 2018, 2021; Lourenço & Velten, 2016, 2017, 2021).

Obviously, the increased pace of descriptions can also bring problems for future identifications, since many species found in Burmese amber show similar morphologies. Consequently, as more and more taxa will be known for a given group, the quality of the pieces required to justify new description is necessarily raised (Lourenço, 2016a,b, 2018, 2021; Lourenço & Velten, 2021, 2022). Precise new descriptions also imply a rather good knowledge of all the fossils previously described. Only this form of procedure can authorise new descriptions without the risk of misidentifications (Lourenço, 2016a,b, 2018, 2021; Lourenço & Velten, 2021, 2022).

In the present contribution three new scorpions are studied; two belong to species previously described, but bringing further confirmation of their status. The third scorpion is represented by an incomplete specimen, but presenting quite unique characters what leading to the description of a new genus and species. Once again, the considerable degree of scorpion diversity in the Burmese amber-producing forests is confirmed.

Material and methods

The specimens investigated are preserved in more or less clear pieces of pale yellow to reddish-yellow resin. More details are proposed before each taxonomic treatment. The scorpion representing the new genus and species is not complete; it represents in fact an exuviae and some parts - most of the metasoma, chelae of pedipalps - certainly have been dislocated during the process of recovering by the resin. Nevertheless, the resin is extremely pale and translucid, consequently many characters are clearly visible, even by transparency. The schematic drawings provided are an interpretation of what was observable. Illustrations and measurements were produced with the aid of a Wild M5 stereomicroscope and a Leica microscope DMLB, both equipped with a drawing tube (camera lucida) and an ocular micrometre. Measurements follow Stahnke (1971) and are given in mm. Trichobothrial notations are those of Vachon (1974, 1975). Other morphological terminologies

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Reviewer:
Eric Ythier (*France*) - ZooBank: http://zoobank.org/06FD0852-A88E-49E5-B8E6-E1494B86C4E1

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mostly follow Hjelle (1990). Trichobothria are definitely recorded when their bothria (areoles) can be observed; nevertheless, several trichobothria were observed even in the opposite faces of a segment thanks to the transparency of the resin. Considering the morphologies of pedipalp and pectines the scorpion is probably a male; since the specimen is an exuviae, it probably represents a pre-adult or a juvenile.

Taxonomic treatment

Superfamily **Buthoidea** C. L. Koch, 1837

Family **Buthidae** C. L. Koch, 1837
(assignment requiring further investigation)

Genus ***Cretaceousbuthus*** Lourenço, 2022 **gen**. **n**.
ZooBank: http://zoobank.org/1F437D8C-DD4D-4DC5-9253-4A752947A67C

Diagnosis for the new genus. – General morphology is globally similar to that of several genera of extant buthoid scorpions and with at least two genera of buthoids previously found in Burmite, namely *Archaeoananteroides* Lourenço, 2016 and *Spinoburmesebuthus* Lourenço, 2017. A combination of characters can however, be used to diagnose the new genus from these two buthoid genera also found in Burmite: a rather large global size compared to all the other scorpions previously found in Burmite with an estimated total length ranging from 45 to 60 mm (see measurements and comments on size after the description). The specimen is rather bulk with short pedipalps. Carapace weakly granulated to smooth; anterior margin with a deep concavity. Three pairs of lateral eyes. Sternum sub-pentagonal to almost triangular. Tergites with one median carinae; lateral carinae inconspicuous. Sternites with large slit-like spiracles. Metasomal segment I with 10 carinae; other metasomal segments not present. Chelae not present. Trichobothrial pattern similar to that of extant buthid type A (Vachon 1974); the dorsal trichobothria of femur presenting a beta disposition (Vachon, 1975). Femur orthobothriotaxic with 4 internal, 5 dorsal and 2 external trichobothria; $\mathbf{d_5}$ and $\mathbf{e_1}$ at the same level. Patella minorante neobothriotaxic with 1 internal, dorsal $\mathbf{d_1}$ and $\mathbf{d_2}$, but absence of $\mathbf{d_3}$, $\mathbf{d_4}$ and $\mathbf{d_5}$; Seven external trichobothria are clearly visible, thanks to the transparency of the piece: **et**, **est**, **em**, $\mathbf{esb_{1,2}}$ and $\mathbf{eb_{1,2}}$. Ventral trichobothria absent. Tibial spurs present on legs III and IV, small in size. Pedal spurs present in all legs.

Etymology. – Generic name refers to the association of Cretaceous horizon and the extant genus *Buthus*.

Type species. - *Cretaceousbuthus fraaijeorum* Lourenço, 2022 **sp**. **n**.

Cretaceousbuthus fraaijeorum Lourenço, 2022 **sp**. **n**.

(Fig. 1-5 & 8-11)
ZooBank: http://zoobank.org/5AE24F06-8B2B-4A57-AE5D-2B8ACC90D604

Diagnosis. – The same as for the genus.

Holotype: Possibly a male, pre-adult or a juvenile depending on the number of molts yet necessary to reach adult stage. The scorpion is represented by an exuviae, incomplete but well preserved in a very clear block of pale yellow amber that measures 32.0 x 16.0 x 5.0 mm. A great amount of inclusions are also present represented by vegetal debris, some insect Coleopterans and dirts.

Type locality and horizon. – Myanmar (Burma), Kachin; precise locality unknown; Lower Cretaceous.

Patronym. – The specific name is a global homage to the family Fraaije for their support to the development of the Oertijdmuseum in Boxtel, The Netherlands.

Depository. – The type specimen is deposited in the collections of the Oertijdmuseum, Boxtel, The Netherlands, under the number MABk03774

Description

Coloration. – The scorpion is yellow to pale yellow; actually, the exuviae is embbebed in a very clear amber resin, consequently, most parts are translucid allowing even observations by transparency.

Morphology. – Carapace weakly granular to smooth; anterior margin with a strong concavity. Carinae inconspicuous; furrows weak. Median ocular tubercle anterior to the centre of the cararapace; median eyes large and separated by less than one ocular diameter; three pairs of conspicous lateral eyes. Sternum subpentagonal to triangular. Genital operculum with two semi-oval plates. Mesosomal tergites weakly granular to smooth, with one median carina; lateral carinae, if present, totally inconspicuous; VII with five carinae; the lateral weak and the internal inconspicous. Pectines large, with 18-19 teeth; fulcra inconspicuous. Sternites smooth, with large slit-like spiracles. Metasomal segment I with 10 strongly marked carinae; other segments and telson not present. Chelicerae not present. Pedipalp femur pentacarinate; patella without carinae, smooth; internal face of femur and patella with spinoid granules. Chela not present. Trichobothrial pattern similar to the extant buthid type A (Vachon 1974); dorsal trichobothria of femur in beta configuration (Vachon, 1975). See diagnosis for details. Legs tarsi with thin setae forming a brush. Tibial spurs present on legs III and IV, weakly marked; pedal spurs present on legs I-IV weak to moderate in size.

Morphometric values (mm), holotype of *Cretaceousbuthus fraaijeorum* Lourenço, 2022 **sp**. **n**.

– *Total length*, by extrapolation*, from 47.38 to 59.70.

– *Carapace*: length 4.34, anterior width 2.87, posterior width 3.94.

– *Mesosoma* length 8.94.

– *Metasomal segment I*: length 2.67, width 2.94.

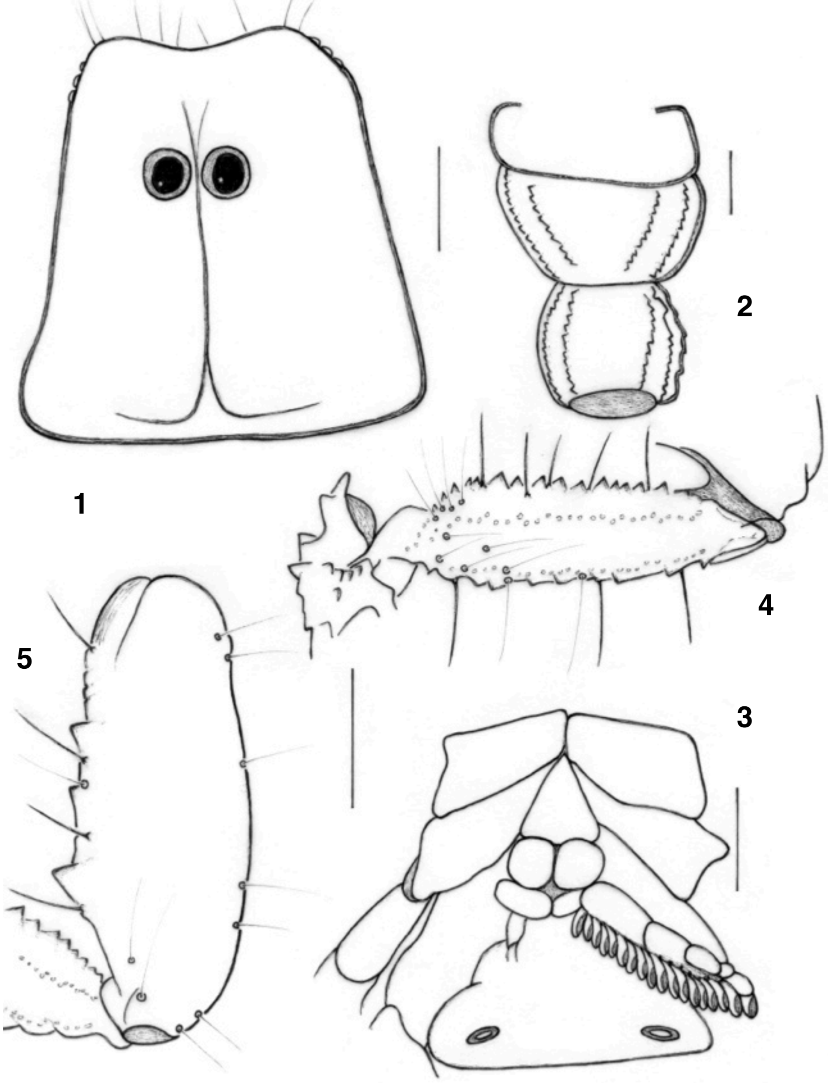
– *Pedipalp*
femur length 2.94, width 0.82
patella length 3.41, width 1.62.

(*) Comments on the possible final total size of the new species. Taking in account the global size of 19.19 mm for *Archaeoananteroides maderai* Lourenço, species showing some similarities with *Cretaceousbuthus fraaijeorum* Lourenço, estimations show that the new species could reach a minimum global size of 37.60 mm. Considering however that the specimen is an exuviae, and applying the growing values estimated by Dyar (1890) and Przibram & Megusar (1912), which are 1.26, one can reach values of 47.38 mm in the case of one extra molt or 59.70 mm for two extra molts.

Other species also examined during this study

Spinoburmesebuthus pohli Lourenço, 2017
(Family Palaeoburmesebuthidae)

A very small juvenile, measuring a total length of 9.93 mm, included in a clear reddish-yellow piece sizing 26 x 12 x 3 mm. The piece contains vegetal debris and some dirts. The species is clearly characterised by the shape of the telson with an aculeus with a very strong base and the presence of several spinoid granules on the pedipalp chelae (Figs. 6, 12). Two species are known for this genus (Lourenço, 2021), but the recently described *Betaburmesebuthus spinipedis* Xuan, Cai & Huang, 2022, most certainly do belong to the genus *Spinoburmesebuthus* (Xuan et al., 2022).



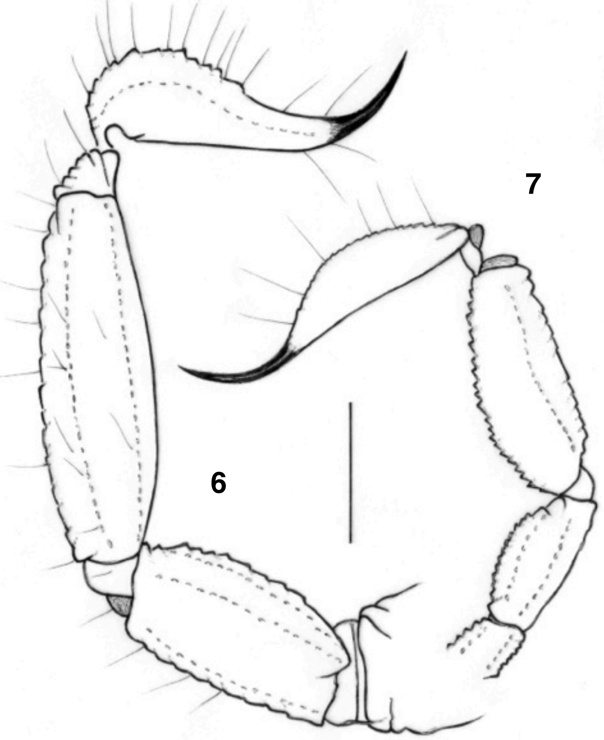


Fig. **6**-**7**. Metasomal segments IV, V and telson, lateral aspect (scale = 0.5 mm).

6. *Spinoburmesebuthus pohli*

7. *Chaerilobuthus serratus*

Fig. **1**-**5**. *Cretaceousbuthus fraaijeorum* Lourenço, 2022 **sp**. **n**. Male holotype (scales = 1 mm).

1. Carapace. **2**. Tergites VI-VII and metasomal segment I, showing carination. **3**. Ventral aspect showing coxapophysis, sternum, genital operculum, pecten and sternite III with spiracles. **4**-**5**. Femur and patella, showing trichobothrial pattern; for comparaison some rigid setae are represented.

Chaerilobuthus serratus Lourenço, 2016
(Family Chaerilobuthidae)

Again, a very small juvenile, measuring a total length of 6.73 mm, included in a more or less clear reddish-yellow to reddish piece sizing 26 x 24 x 2 mm. The state of conservation of this specimen is moderate to poor since the scorpion is strongly mummified. Moreover, the piece contains quite many inclusions mostly vegetal debris, dirts, but also some insects, mites and spiders. This species is clearly recognized by the shape of the telson, long and flat, and in special by the presence of numerous spinoid granules on the dorsal aspect of metasomal segments IV and V, forming serrulas (Fig. 7 & 13).

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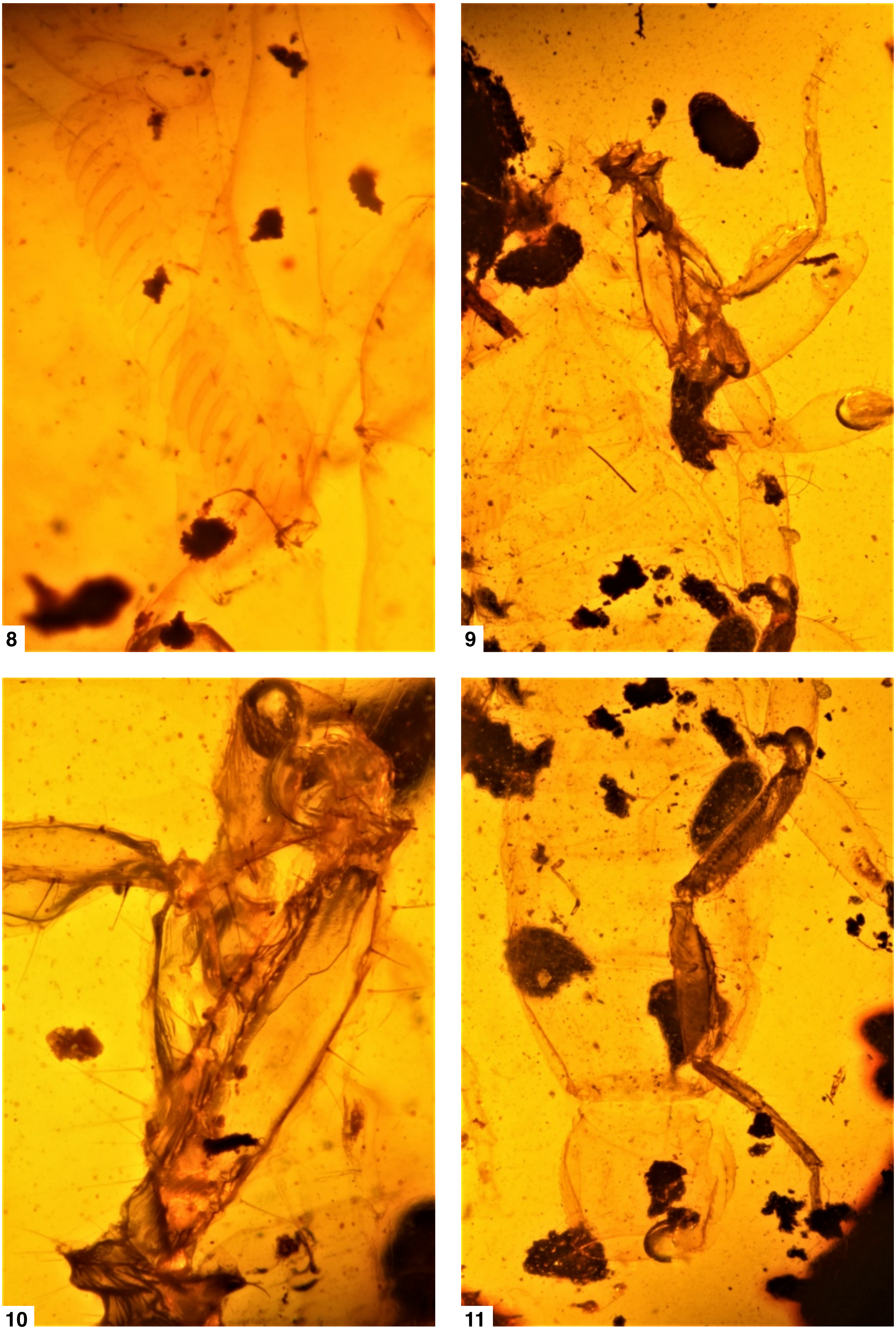

Fig. 8-11. *Cretaceousbuthus fraaijeorum* Lourenço, 2022 **sp**. **n**. Male holotype.

8. Right pecten, in detail. **9**. Right pedipalp showing the femur and patella on dorsal aspect. By transparency the ventral side can be observed, showing sternum, genital operculum and one pecten. **10**. Femur, dorsal aspect, in detail; some trichobothria are clearly observable. **11**. Right leg IV, in detail.

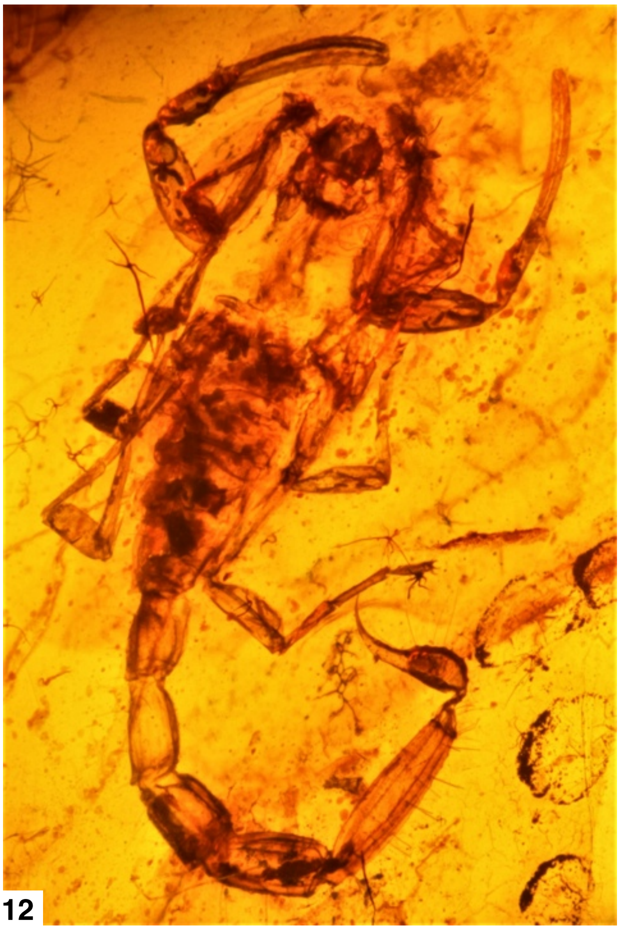

Fig. 12. *Spinoburmesebuthus pohli*. Habitus of juvenile, dorsal aspect.

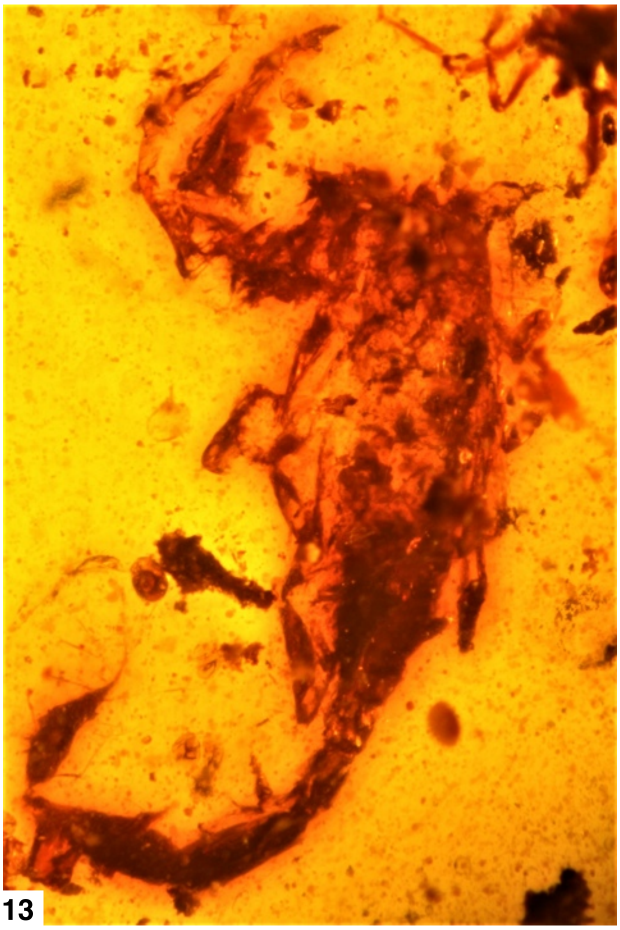

Fig. 13. *Chaerilobuthus serratus*. Habitus of juvenile, dorsal aspect.

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Résumé

Lourenço W. R. & Velten J., 2022. – Nouvelles données sur les scorpions de l'ambre du Crétacé inférieur du Myanmar avec les descriptions d'un nouveau genre et d'une nouvelle espèce (Scorpiones: Buthoidea: Buthidae). *Faunitaxys*, 10(35): 1 – 5.

L'étude de trois nouveaux spécimens de scorpions de l'ambre du Crétacé inférieur du Myanmar conduit à la description d'un nouveau genre et d'une nouvelle espèce qui peuvent, une fois de plus, être associés à la lignée des Buthoidea ainsi que à la famille des Buthidae. La nouvelle espèce présente également des caractères très distincts, notamment une trichobothriotaxie minorante, lorsque comparée à d'autres éléments préalablement trouvés dans l'ambre Crétacé du Myanmar, et confirme ainsi l'existence d'une importante diversité au sein de cette faune. La validité de deux espèces préalablement décrites est également confirmée : *Spinoburmesebuthus pohli* Lourenço, 2017 (Famille Palaeoburmesebuthidae) et *Chaerilobuthus serratus* Lourenço, 2016 (Famille Chaerilobuthidae).

Mots-clés. – Scorpiones, Buthidae, fossile, nouvelle espèce, nouveau genre, *Cretaceousbuthus*, *fraaijeorum*, Ambre Birman, variabilité, description.

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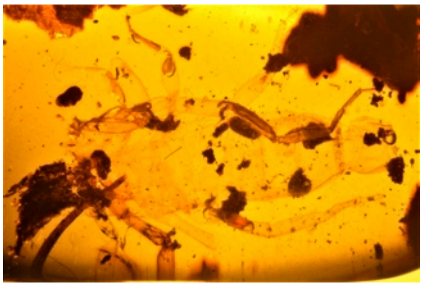

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Cretaceousbuthus fraaijeorum Lourenço **sp**. **n**.

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